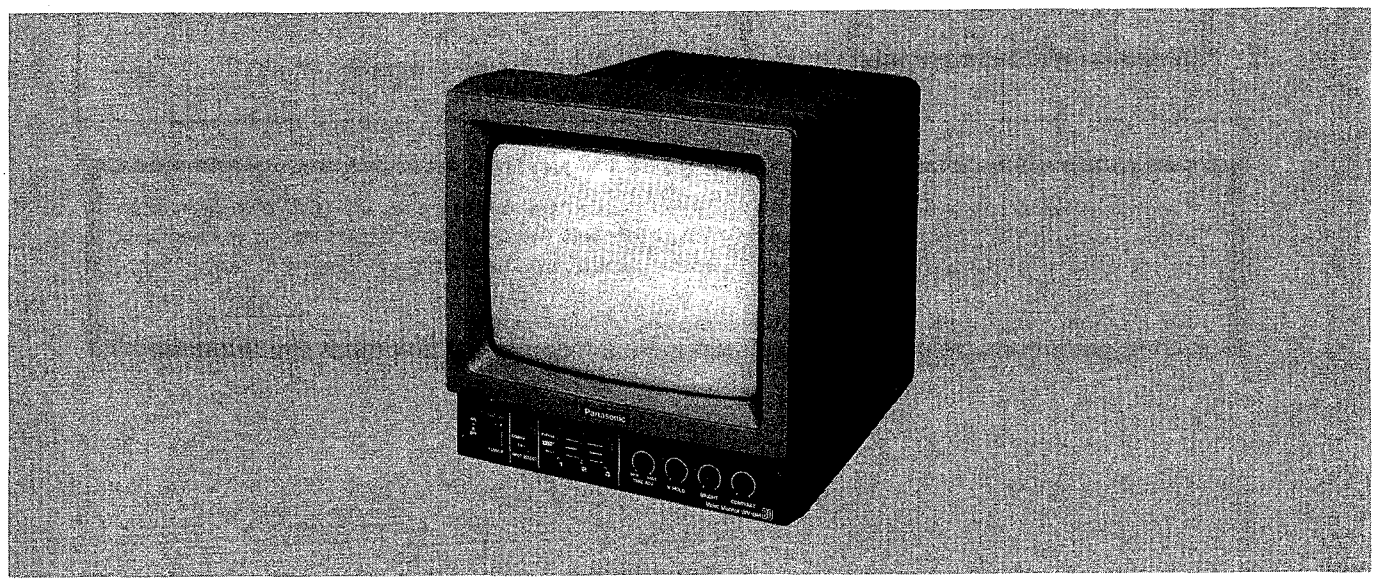
ORDER NO. AVS9008367C8

Service Manual

Video Monitor

WV-BM80



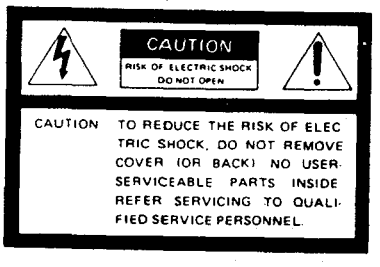
SPECIFICATIONS

Power Supply:	240 V AC 50 Hz for WV-BM80/A and WV-BM80/B 220 V AC 50 Hz for WV-BM80/G
Power Consumption:	45 W
Camera Input:	1.0 Vp-p/75 ohms, composite × 3 (BNC)
Video Input:	1.0 Vp-p/75 ohms, composite × 1 (BNC)
Video Output:	1.0 Vp-p/75 ohms, composite × 1 (BNC)
Power Supply for Camera:	Regulated Current multiplex method
Camera Switching:	Manual/Auto (Sequence) With manual bypass
Sequential Switching Interval:	Adjustable; 1 to 30 sec.
Resolution (Horizontal):	750 lines at center
Sweep Linearity:	V: Less than 7% H: Less than 5%
Dimensions:	230(W) × 240(H) × 264(D) mm
Weight:	3.8 kg

Weights and dimensions shown are approximate.
Specifications are subject to change without notice.

System Cameras
WV-BL90
WV-80

Panasonic


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION TO REDUCE THE RISK OF ELEC TRIC SHOCK, DO NOT REMOVE COVER (OR BACK) NO USER-SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALI-FIED SERVICE PERSONNEL.

This symbol warns the user that uninsulated voltage within the unit may have suificient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the " ⚠ " mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacturer.

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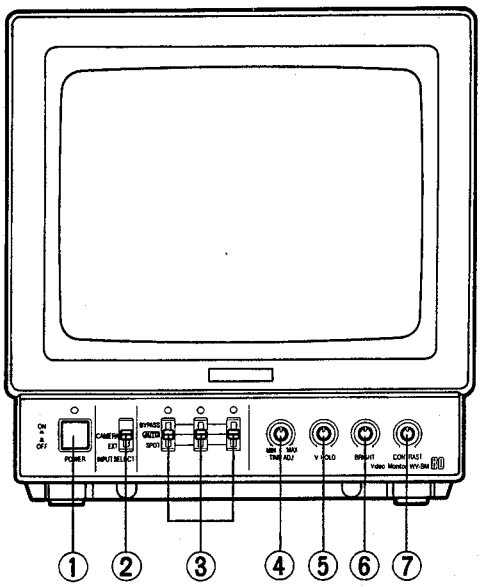
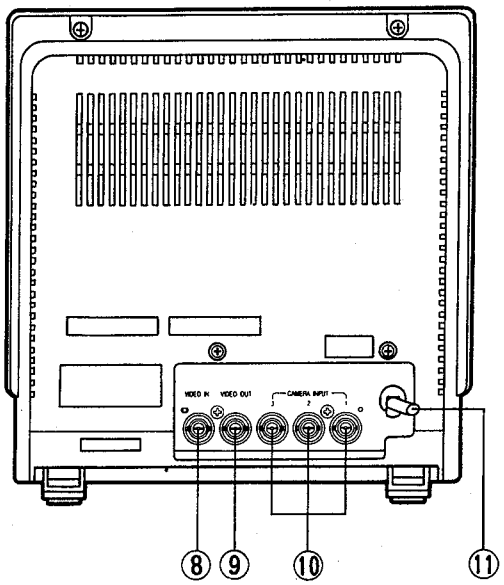
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS





1. Power ON/OFF Switch (POWER)

This is a push type switch which turns the monitor ON and OFF.

Push once and the switch remains down (▬) for turning on the monitor and cameras.

Power and camera number indicator lamps light on.

Push again, the switch comes up (▮) for turning off the monitor and cameras, and the lamps go off.

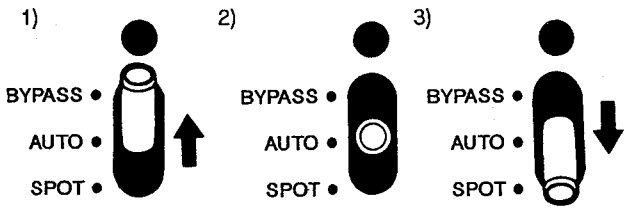
2. Input Selection Switch (INPUT SELECT, EXT/CAMERA)

This selects the condition of the monitor as;

EXT: VTR playback picture or an external camera connected to the Video Input Connector (8) can be observed.

CAMERA: Camera picture connected to Camera Input Connector (10) can be observed.

3. 3-Position Selector Switch



1) BYPASS mode

When the switch is set to this mode, the signal of the camera in that position will be skipped regardless of the presence of video signals. In other words, the signals of that camera will not be fed out to Video Output Connector.

2) AUTO mode

When the switches are set to this mode, the signals of the camera will be automatically in sequence.

3) SPOT mode

When this mode is selected, the signal of the camera in that position will come out of the Video Output connector (9) so that the camera signal can be selectively monitored. If two or more cameras are set to this mode, the signal of the lower-numbered camera will be fed out to the Video Output Connector (9).

4. **Time Adjustment (TIME ADJ, MIN/MAX)**
   The interval of the sequential switching can be manually adjusted from 1 to 30 seconds by adjusting this knob.

5. **Vertical Hold Control (V.HOLD)**
   Locks in the picture of the monitor vertically.

6. **Bright Control (BRIGHT)**
   Turn this control clockwise to increase the picture brightness.

7. **Contrast Control (CONTRAST)**
   Turn this control clockwise to increase the picture contrast.

8. **Video Input Connector (VIDEO IN)**
   This is an external video input connector for the camera or the VTR playback picture.
   When the external video signal is to be shown on the video monitor, set the Input Selection Switch (2) to the EXT position.

9. **Video Output Connector (VIDEO OUT)**
   This connector is used to provide the video output signal of the camera to the additional monitor or video tape recorder.

10. **Camera Input Connectors (CAMERA INPUT)**
    These connectors are used to connect the specified cameras.
    These connectors supply the DC power and vertical drive pulse to the cameras, and receive the video signal from the cameras.
    Note:
    - o Be sure to connect only the specified cameras such as WV-BL90 or WV-80.
    - o Connect the camera after making sure that the monitor is off.
      If the camera is connected while the monitor is on, the camera will not be functioned by activating the protection circuit for misconnection.

11. **Power Cord**

CIRCUIT DESCRIPTION

1. Main Board

1-1 Power Circuit

This circuit generates the regulated + 12V DC, + 13 V DC and + 19V DC from 220/240V AC.

1-2 Video Amplifier Circuit

The composite video signal fed to base of Q101.
The video signal from the emitter of Q101 is fed through VR1 (CONTRAST) , amplifier Q102, Q103, Q104 and Q106 to cathode of CRT.

1-3 H.V Deflection Circuit

This circuit generates vertical (V) deflection sawtooth current for V scanning of the beam inside the cathode ray tube (CRT) and horizontal (H) deflection sawtooth current for horizontal scanning of the beam inside the cathode ray tube.

1-4 High Voltage Circuit

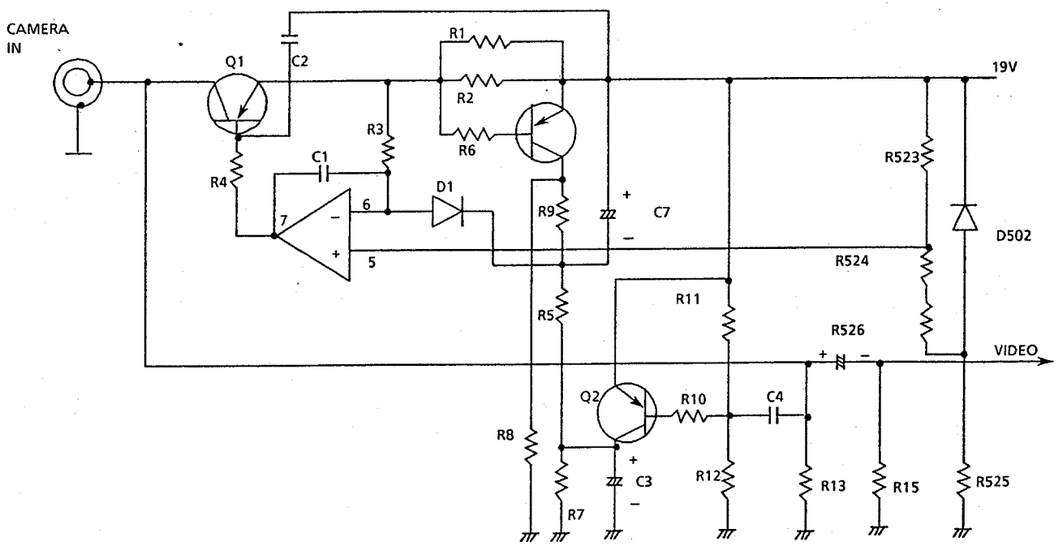
This circuit generates high voltages for cathode ray tube (CRT) electrodes.
The flyback pulse generated by horizontal (H) deflection circuit is supplied to the primary winding of the flyback transformer (FBT) in high voltage pack T102 to step up the flyback pulse to the necessary level. The boosted pulses obtained at the secondary winding of the transformer are rectified to generate high voltages.

1-5 Camera Power Circuit

The video monitor WV-BM80 has three camera power circuit which supply the DC power to the specified cameras through the coaxial cable respectively. Since these three circuits are exactly same, the power supply circuit for camera-1 will be described.
This circuit consists of a constant current circuit, and a misconnection protection circuit.

• Constant Current Circuit

In order to compensate the difference of voltage drop due to the coaxial cable length between the video monitor and camera, this circuit applies the constant current to the camera regardless of coaxial cable length.
+ 19V DC supplied from D8 is divided by zener diode D502, R523, R524, R525 and R526. The divided DC voltage is supplied through operation amplifier IC301 (1/4) to base of impedance converter Q301 for controlling the camera DC power to steady state.
The variation of load current due to coaxial cable length is detected by R301 and R302 as a voltage change and the changed voltage is supplied to operation amplifier IC301 (1/4) which compensates the voltage differences between pins 5 and 6 of IC301. Therefore, even if the cable length is changed, current fed to detecting resistors R301 and R302 is kept constant and the constant current is supplied to the camera.



• Misconnection Protection Circuit

The video signal from the camera is multiplexed on the power line, the misconnection protection circuit protects the power circuit from a open or short circuit.
The moment the power of monitor is turned on, the constant current circuit starts to operate and sends the constant current 260mA to the camera.
Then the constant current will be controlled ON or OFF by Q2 and Q3 operation.
Except that Q2 and Q3 both are in the ON position, D1 is turned on and the constant current is intercepted.
When the power of monitor is turned on, the constant current is been sending to the camera for a certain time, which is decided by the time constant of C7, R5, R8 and R9, without the operation of Q2 and Q3.

• In case of the camera is connected
After turning on the power of the monitor, 260mA is been sending to the camera and the oscillation circuit (40KHz) in the camera is operated. Then its oscillation Waveform passes through the C4 and makes Q2 turn on.
In this time, the Q3 also is in the ON position.
Therefore the constant current is kept sending.
When the camera gets the regular current from monitor, the oscillation circuit in the camera is stopped .But the gen-lock signal of the camera makes the Q2 turn on soon after.

• In case of the camera Input Terminal is opened.
Q2 and Q3 both are turned off and to send the current is stopped.
The voltage, which has been output immediately after turning on the power, is discharged by the R13 and is in OV.

• In case of the camera Input Terminal is shorted (Or In case of the low impedance is connected)
After turning on the power, Q3 is turned on and Q2 is turned off.
Therefore the 260mA current is flowing only in a moment.

• In case of the video signal is input (except the system camera WV-BL90 and WV-80)
The Q2 is turned on but the Q3 is turned off.
Therefore the current and voltage is not out put.

1-6 Camera Selection Circuit

This circuit selects the camera signal which is supplied to signal processing circuit for observing the selected picture on the monitor. Three camera selection circuits are existed on the monitor and are exactly same, so that the camera-1 will be described.
When camera-1 is selected by Auto mode or spot monitoring mode, Q213 becomes L level and the L level is fed to Q305 to turn ON Q305. Therefore the camera-1 signal obtained at emitter of Q306 is supplied to signal processing circuit.

1-7 Signal Processing Circuit

The video signal from the camera-1 supplied to Q305 on the Main board is mixed with the VD pulse which is sent through VD pulse generator Q211 and inverter Q304 and supplied to the camera for vertical synchronization.
The video signal with VD pulse is supplied through Q306 to clamp circuit Q201.
In the clamp circuit, horizontal (H) and vertical (V) blanking periods of video signal is clamped by the clamp pulse which is generated by sync separator Q107.
The video signal is sent to VD erase circuit Q202 where the V.sync is added and VD pulse is removed by the VDE pulse. This signal is supplied to slicer consisting of Q204 - Q205 where low level of sync signal is clipped and the sync level is set to 0.3Vp-p.
The video output circuit consisting of Q103 ~ Q104 amplifies the camera video signal for setting it to specified signal level and compensates the frequency response. This signal is supplied to VIDEO OUTPUT connector.

ADJUSTMENT PROCEDURE

1 TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of WV-BM80.

- o Oscilloscope
- o Digital Voltmeter
- o Completely aligned Black and White Camera WV-BL90
- o Frequency Counter
- o Resolution Chart (YWV1400RB99)

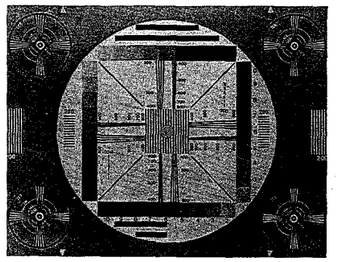


Fig. 1-1

2 DISASSEMBLY PROCEDURE FOR ADJUSTMENT

- Remove six screws holding the cover and remove the cover by pulling it backward.

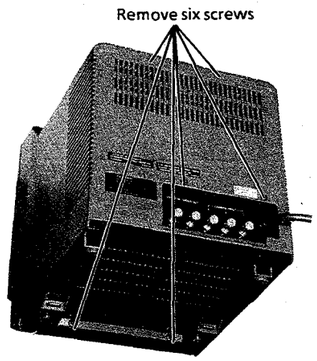


Fig. 2-1

3 CRT REPLACEMENT

- Remove the cover as previously described in section 2.
- Remove two screws holding the front chassis and slide back the chassis with PCB unit.
- Disconnect the anode cap.

  Caution : Make sure that the anode voltage is completely discharged by directly connected between anode terminal and chassis.

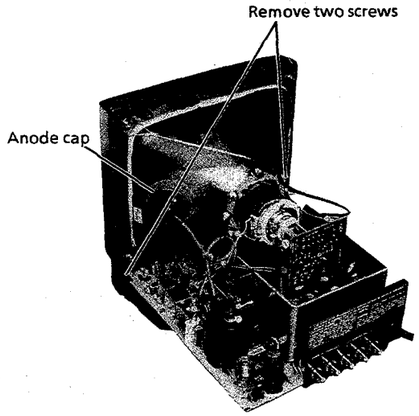


Fig.3-1

- Disconnect the CRT socket by pulling it backward.
- Loosen the screw holding deflection yoke and convergence magnets ass'y and remove the yoke and magnets assembly by pulling it backward.

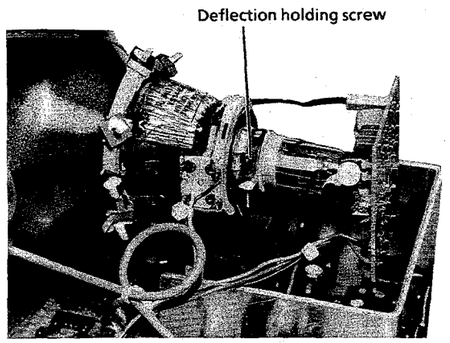


Fig. 3-2

- Remove four screws holding CRT and remove CRT.

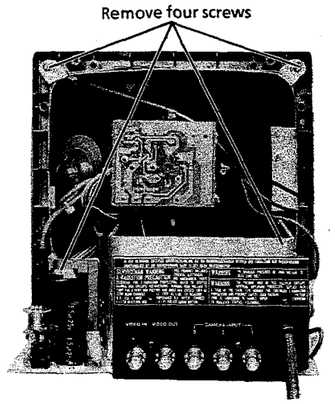
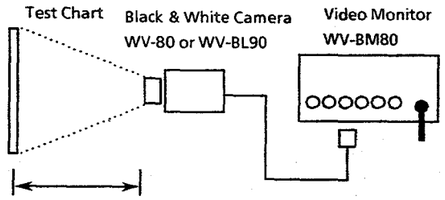


Fig. 3-3

4 CONNECTION AND SETTING UP FOR ADJUSTMENT

- Connect the coaxial cable between the VIDEO OUTPUT terminal of B/W Camera WV-BL90 or WV-80 and CAMERA INPUT connector 1, 2 or 3 of Video Monitor WV-BM80.



Approx. 1.7ft (0.5m)

5 ADJUSTMENT

(1) DC current adjustment

Adjust :	**VR1 (DC CURRENT)**	**Control board**
Observe :	**DC current meter**	

- Connect the DC current meter between the video camera WV-BL90 and CAMERA INPUT 1 connector of Video Monitor WV-BM90.
- Turn ON the power switch.
- Adjust VR1 (DC CURRENT ADJ) for 260mA + 15, -10mA.
- Confirm that the DC current of CAMERA INPUT connectors 2 and 3.

(2) H hold, V hold coarse adjustment

Adjusts :	**VR2 (SUB BRIGHT)**	**Main board**
	VR5 (H. HOLD)	**Main board**
	VR11 (V. HOLD)	**Control board**

- Set the controls and switches on the Main board and CRT Socket board as follows.

Input Selection switch :	**EXT position**
Contrast Control :	**Mechanical Center position**
Bright Control :	**Mechanical Center position**
Vertical hold control :	**Mechanical Center position**
Horizontal hold control :	**Mechanical Center position**
Sub Bright control :	**Mechanical Center position**

- Connect the completely aligned video camera WV-BL90 to CAMERA INPUT connector 1, 2 or 3 of Video Monitor WV-BM80.
- Aim the camera at the resolution chart (YWV1400RB99).
- Turn ON the power switch.
- Adjust the VR2 (SUB BRIGHT) so that the raster will just appear.
- Adjust VR5 (V.HOLD) and VR8 (H.HOLD) so that the circle of the resolution chart on the Monitor screen becomes center position.

(3) Picture tilt adjustment

Adjust : Deflection coil

- Loosen the deflection coil holding screw.
- Turn the deflection coil until the raster on the monitor screen is straight.
- Carefully tighten the deflection coil holding screw.

(4) Centering adjustment

Adjust :	**Centering magnets**	
	L108 (H. WIDTH)	**Main board**

- Adjust the centering magnets until the raster comes to the center of monitor screen becomes true circle.
- Adjust L108 (H. WIDTH) so that the circle of the resolution chart on the Monitor screen.

(5) Vertical height and linearity adjustment

Adjust :	**VR7 (V.LIN)**	**Main board**
	VR6 (V. HEIGHT)	**Main board**

- Adjust VR6 (V. HEIGHT) and VR7 (V. LIN) so that the circle in the chart is nearly a true circle.

(6) Sub-brightness adjustment

Adjust : VR2 (SUB BRIGHT) CRT Socket board

- Set the controls on the volume board as follows.

Contrast Control (VR1) : Fully counter clockwise

Bright Control (VR2) : Mechanical Center position

- Turn VR1 (CONTRAST) at fully counter clockwise .
- Turn VR3 (BRIGHT) at mechanical center position.
- Turn VR2 (SUB BRIGHT) fully clockwise and then turn it back so that the raster will just go out.
- Turn VR1 (CONTRAST) at mechanical center position.

(7) H hold fine adjustment

Adjust : VR5 (H.HOLD) Main board

VR11 (V. HOLD) Control board

- Disconnect all cameras from the camera input connector 1,2 and 3.
- Connect the frequency counter to pin 2 (Red wire) of deflection coil and adjust the VR8 (H HOLD) on the Main board for 15.7KHz ± 100Hz.

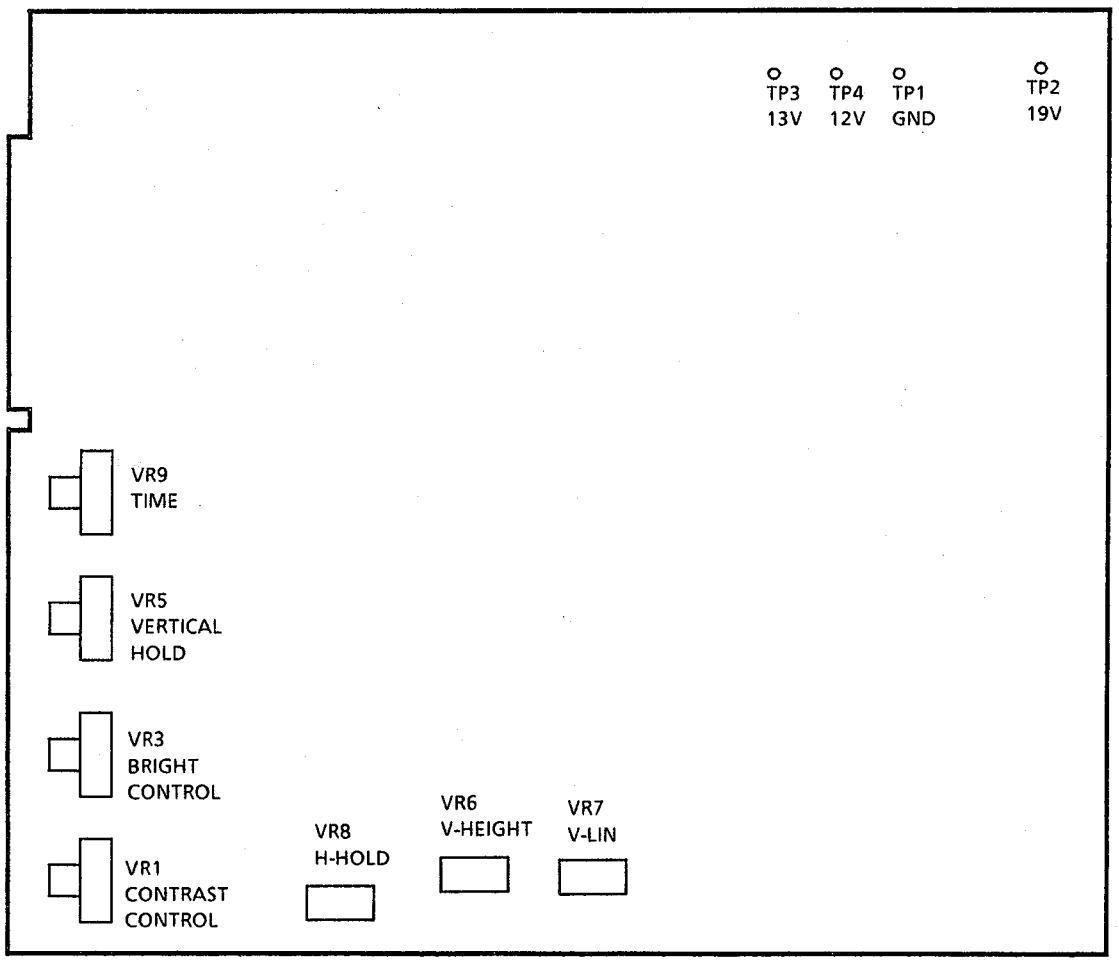
(8) Focus fine adjustment

Adjust : VR4 (FOCUS) Main board

- Adjust VR4 (FOCUS) for best focus in the monitor.

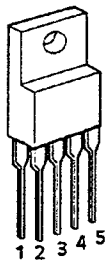
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

MAIN BOARD

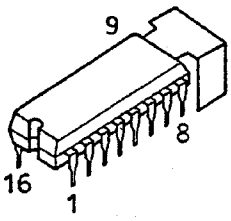


APPEARANCE OF IC, TRANSISTOR AND DIODE

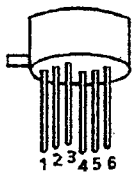
SI3120CA



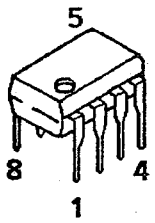
μPC1379C



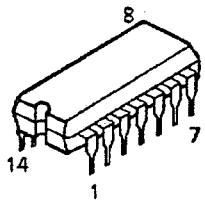
LQT60X1



MC1455P



MC14013BCP



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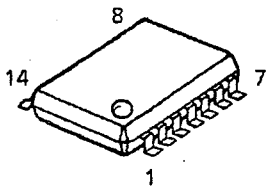

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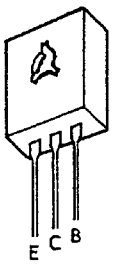
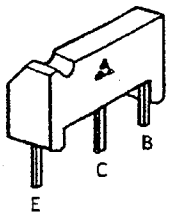
2SC2258



2SB941-PQ
2SD1274B

2SB642-QRS 2SB641-QRS
2SD636-QRS



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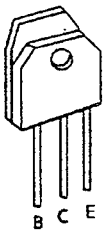

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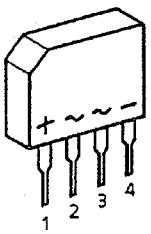

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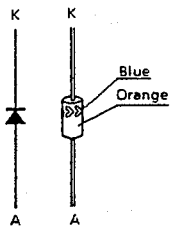
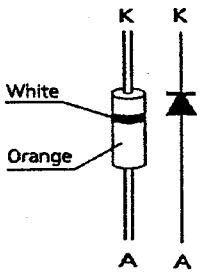
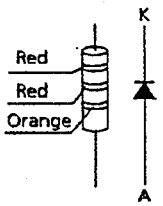


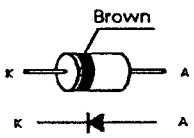
MA165TA



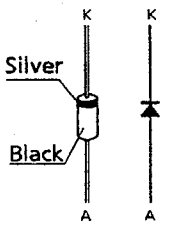
MA4083MTA



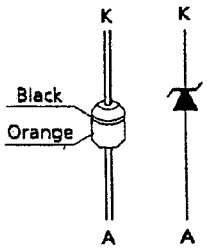
RU4ZLFT2



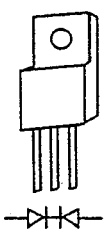
EM01ZV0 EU02EV0
ES01EV0



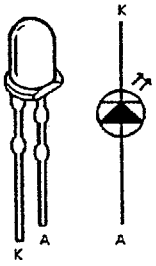
RD6.2FBI



FMU21S



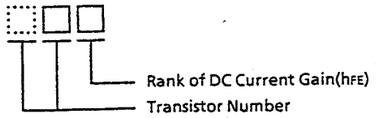
LN38GP
LN28RP



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.



Transistor Number

(Chip Transistor)

Letter	Transister No.	Letter	Transister No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1A	2SB799
E	2SA1022	1B	2SB814
F	2SA1034	1C	2SB902
H	2SA1035	1F	2SK321
I	2SB792	1K	2SK316
K	2SC2778	1L	2SK247
P	2SD814	1M	2SJ84
Q	2SD813	1N	2SK199
R	2SC2480	1O	2SK198
S	2SC2405	1T	2SC3077
T	2SC2406	1X	2SC2845
U	2SC2404	1Z	2SD1030
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

(Small Chip Transistor)

Letter	Transister No.
A	2SB1218
U	2SC3931
W	2SD1820
Y	2SD1819
E3	2SA1226
OS	2SB1219
UC	2SA1532
YU	2SC3938

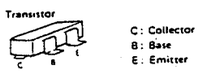
(Pair Transistor)

Letter	Transister No.
5C	XN4601
5N	XN6501
5O	XN6401

Example :

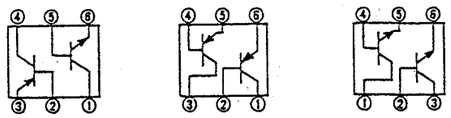
WQ ⟶ 2SD602 - Q
YQ ⟶ 2SD601 - Q
1BS ⟶ 2SB814 - S

Appearance and Symbols



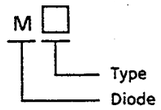
	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

XN4601 XN6401 XN6501



2. Chip Diode

The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

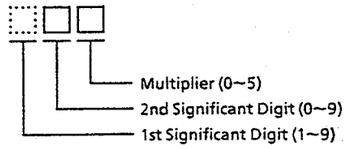
Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

Appearance and Symbols

	1	2	3
MA28/MA28W/MA28T	-	Anode	Cathode
MA151K/MA152K	-	Anode	Cathode
MA151A/MA152A	-	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



Example :

330 ⟶ $33 \times 10^0 = 33$ ohms
561 ⟶ $56 \times 10^1 = 560$ ohms
123 ⟶ $12 \times 10^3 = 12$ ohms

Note : Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

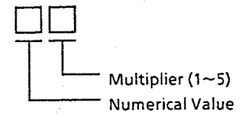
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

Example :

0.5 ⟶ 0.5 pF
75 ⟶ 0.75 pF
1 ⟶ 1 pF
2.5 ⟶ 2.5 pF
33 ⟶ 33 pF
82 ⟶ 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	O	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

*Letters I and O are not used

Example :

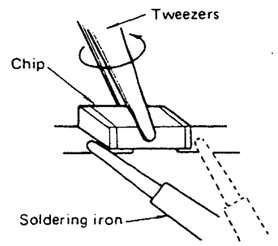
A1 ⟶ $10 \times 10^1 = 100$ pF
N2 ⟶ $33 \times 10^2 = 3300$ pF
S3 ⟶ $47 \times 10^3 = 47000$ pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

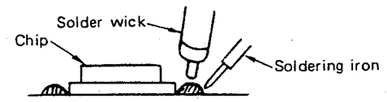
5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note : Be careful not to damage other chips.

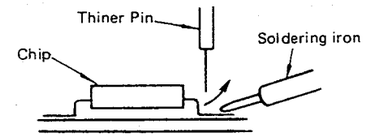


5-2 Removal (IC)

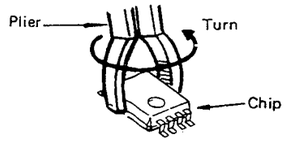
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

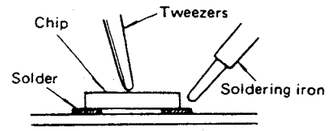


3. Remove IC turning it with plier.

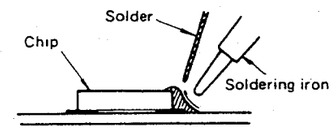


5-3 Mounting

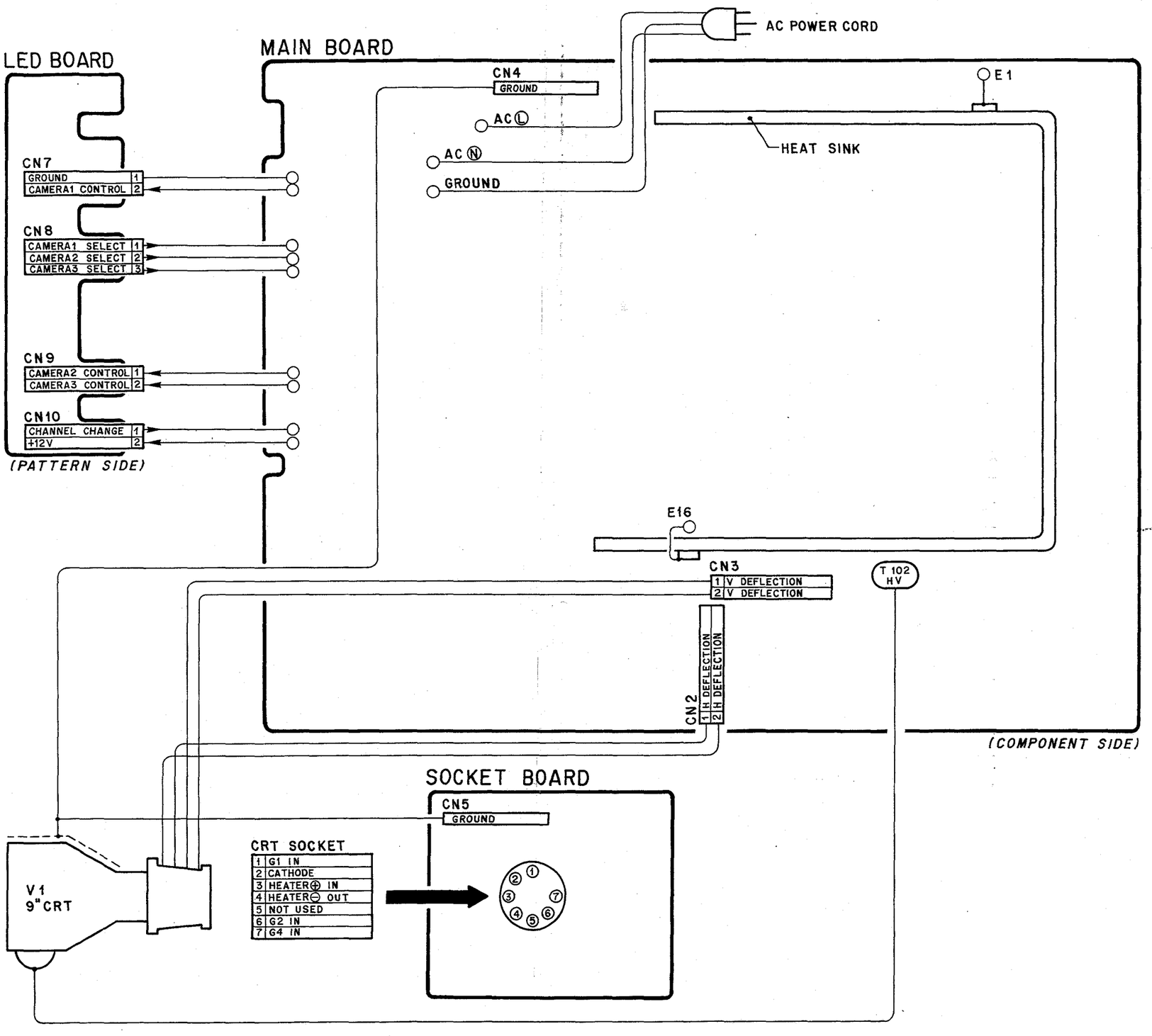
1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



3. Solder both ends of chip (three leads for chip transistor).



WIRING DIAGRAM



MAIN BOARD

POWER CIRCUIT

/AB 240V/50Hz
/G 220V/50Hz

SW1
POWER
ON/OFF
SWITCH

SW1
L1
D1
Q1
SWITCHING
T1
TP2 (+19V)
+19V
TP3 (+13V)
TP4 (+12V)
IC1
+12V REGULATOR
+12V

H.V. DEFLECTION CIR

+12V
VR5
V. HOLD
IC101
SYNC SEPA
V.OSC
AFC
VR6
V. HEIGHT
BOOST
H.OSC
H. PRE DRIVE
V.OUT
REG
VR7
V.LIN
TAB

VIDEO IN
VIDEO OUT
Q206~Q208
VIDEO OUT AMP

SW2
EXT
CAME
SW2
INPUT
SELECTION
SWITCH

CAMERA POWER CIRCUIT

SIGNAL PROCESSING CIRCUIT

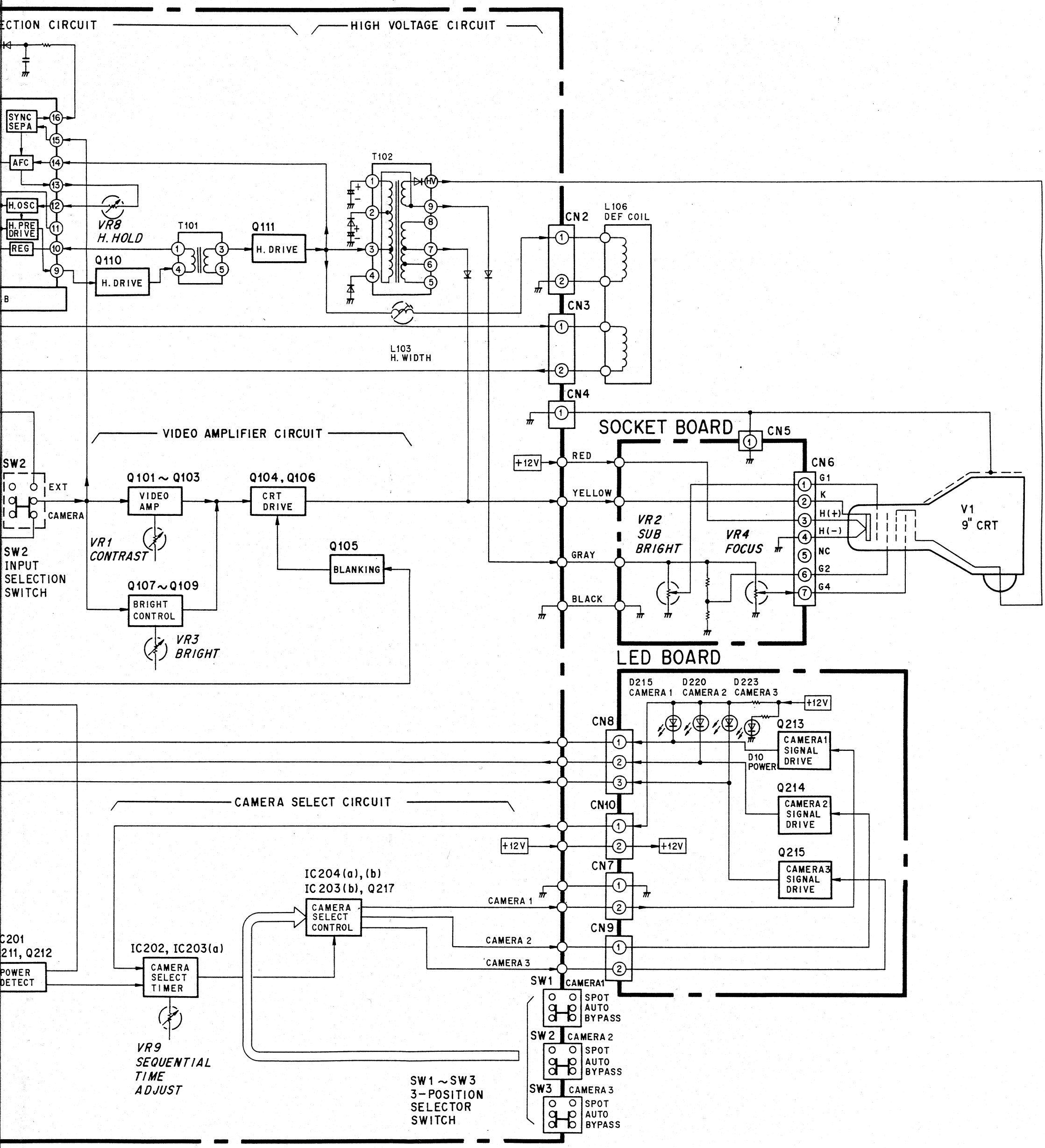
CN1-1
CAMERA1
Q305, Q306
VIDEO SIGNAL SWITCH
Q202, Q204, Q205
VIDEO AMP
Q201, Q209, Q210
SYNC SEPARATION
IC301(b), Q301
CAMERA POWER SUPPLY
+19V
Q302, Q303
OVERLOAD PROTECTOR

CN1-2
CAMERA2
Q405, Q406
VIDEO SIGNAL SWITCH
IC301(c), Q401
CAMERA POWER SUPPLY
+19V
Q402, Q403
OVERLOAD PROTECTOR

CN1-3
CAMERA3
Q505, Q506
VIDEO SIGNAL SWITCH
IC301(a), Q501
CAMERA POWER SUPPLY
+19V
Q502, Q503
OVERLOAD PROTECTOR

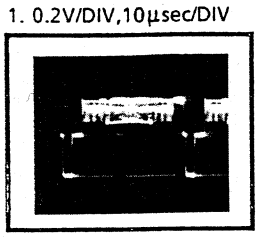
IC201
Q211, Q212
+12V
POWER DETECT

CK DIAGRAM

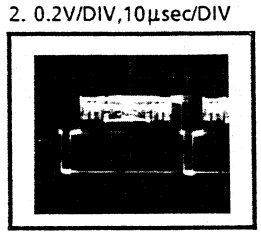

ECTION CIRCUIT
HIGH VOLTAGE CIRCUIT
SYNC SEPA
AFC
H.OSC
H.PRE DRIVE
REG
VR8 H. HOLD
T101
Q111
H. DRIVE
Q110
H. DRIVE
T102
HV
CN2
L106 DEF COIL
CN3
L103 H. WIDTH
CN4
SOCKET BOARD
CN5
CN6
+12V
RED
YELLOW
GRAY
BLACK
VR2 SUB BRIGHT
VR4 FOCUS
G1
K
H(+)
H(-)
NC
G2
G4
V1 9" CRT
VIDEO AMPLIFIER CIRCUIT
SW2
EXT
CAMERA
SW2 INPUT SELECTION SWITCH
Q101 ~ Q103
VIDEO AMP
Q104, Q106
CRT DRIVE
VR1 CONTRAST
Q105
BLANKING
Q107~Q109
BRIGHT CONTROL
VR3 BRIGHT
LED BOARD
D215 CAMERA 1
D220 CAMERA 2
D223 CAMERA 3
+12V
CN8
Q213
CAMERA1 SIGNAL DRIVE
D10 POWER
Q214
CAMERA 2 SIGNAL DRIVE
Q215
CAMERA3 SIGNAL DRIVE
CN10
CN7
CN9
CAMERA SELECT CIRCUIT
IC204(a),(b)
IC203(b), Q217
CAMERA SELECT CONTROL
CAMERA 1
CAMERA 2
CAMERA 3
C201
211, Q212
POWER DETECT
IC202, IC203(a)
CAMERA SELECT TIMER
VR9 SEQUENTIAL TIME ADJUST
SW1 ~ SW3 3-POSITION SELECTOR SWITCH
SW1 CAMERA1
SW2 CAMERA 2
SW3 CAMERA 3
SPOT
AUTO
BYPASS

<Waveforms>

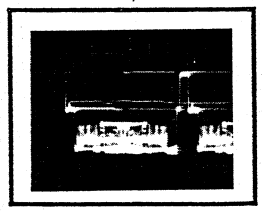
1. 0.2V/DIV,10μsec/DIV



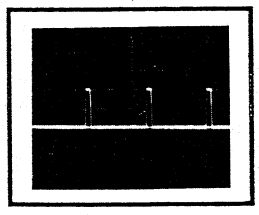
2. 0.2V/DIV,10μsec/DIV



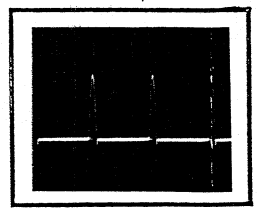
3. 5V/DIV,10μsec/DIV



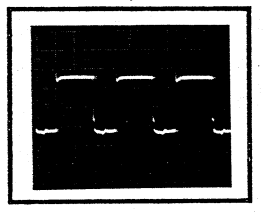
4. 5V/DIV,20μsec/DIV



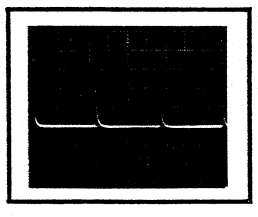
5. 50V/DIV,20μsec/DIV



6. 5V/DIV,20μsec/DIV

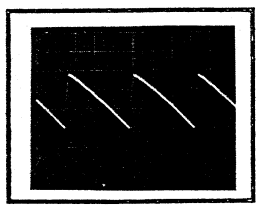


7. 1V/DIV,5msec/DIV

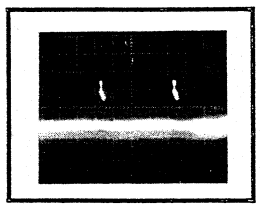


8. 1V/DIV,

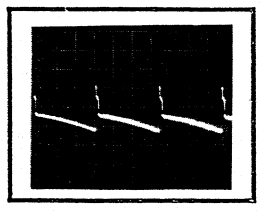
11. 0.2V/DIV,5msec/DIV



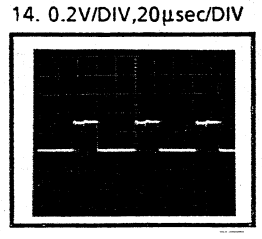
12. 5V/DIV,5msec/DIV



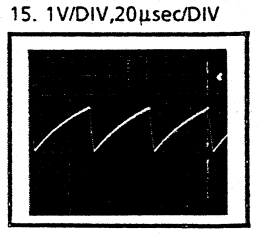
13. 5V/DIV,5msec/DIV



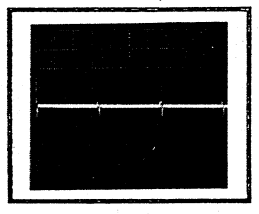
14. 0.2V/DIV,20μsec/DIV



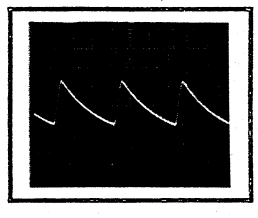
15. 1V/DIV,20μsec/DIV



16. 0.1V/DIV,20μsec/DIV

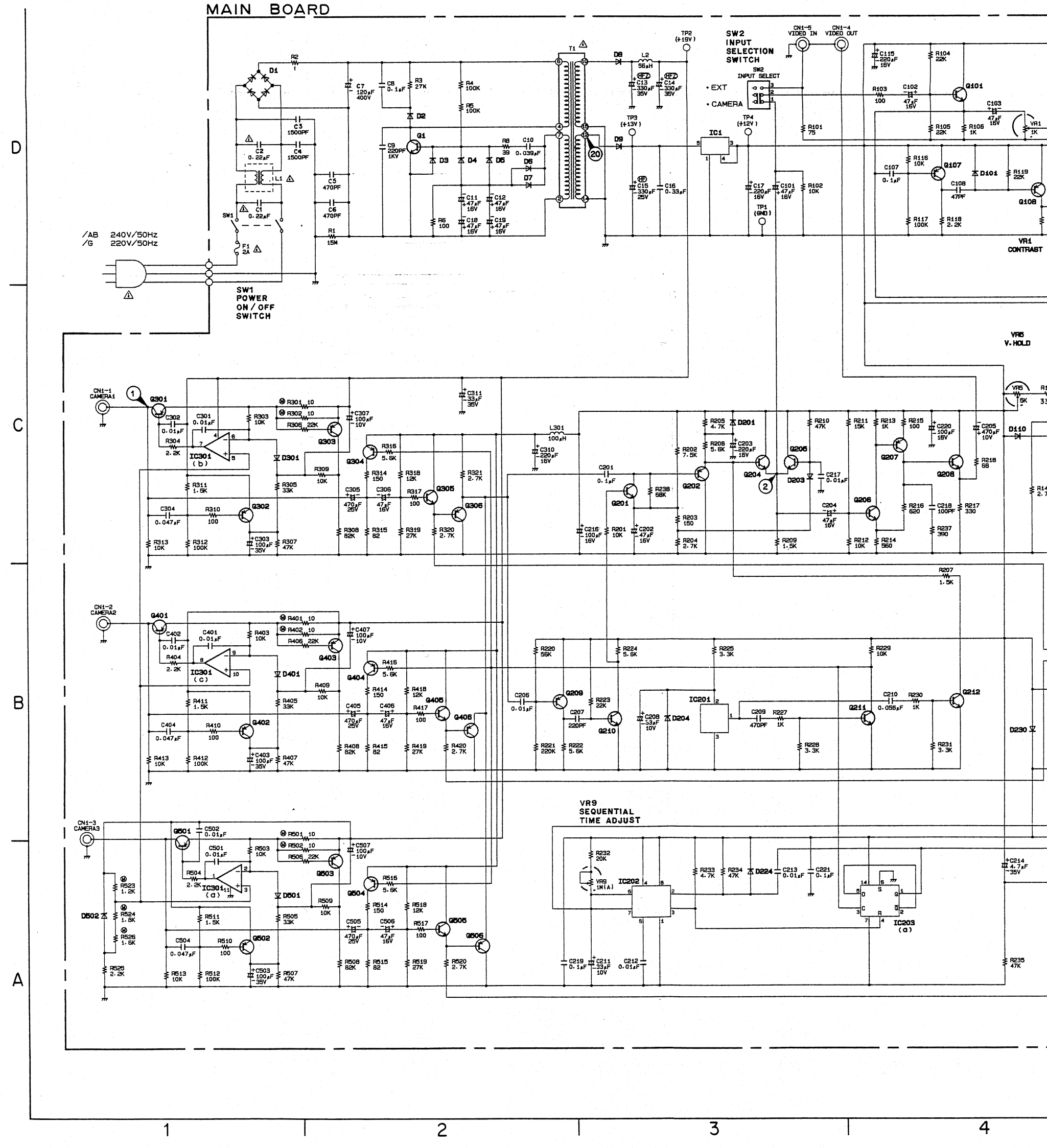


17. 0.5V/DIV,20μsec/DIV



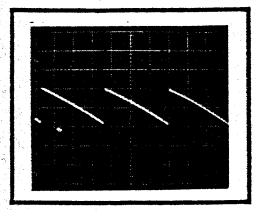
18. 0.2V/D

MAIN BOARD

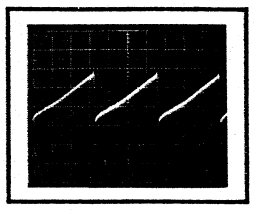


MATIC DIAGRAM

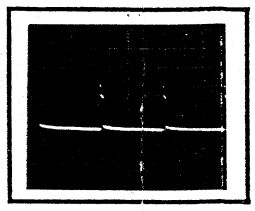
8. 1V/DIV,5msec/DIV



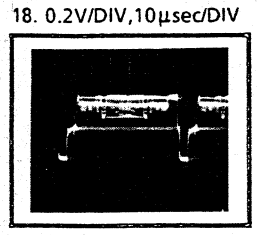
9. 50mV/DIV,5msec/DIV



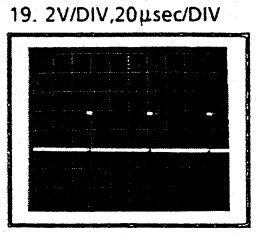
10. 5V/DIV,5msec/DIV



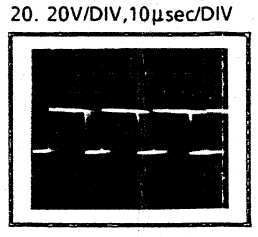
18. 0.2V/DIV,10μsec/DIV



19. 2V/DIV,20μsec/DIV

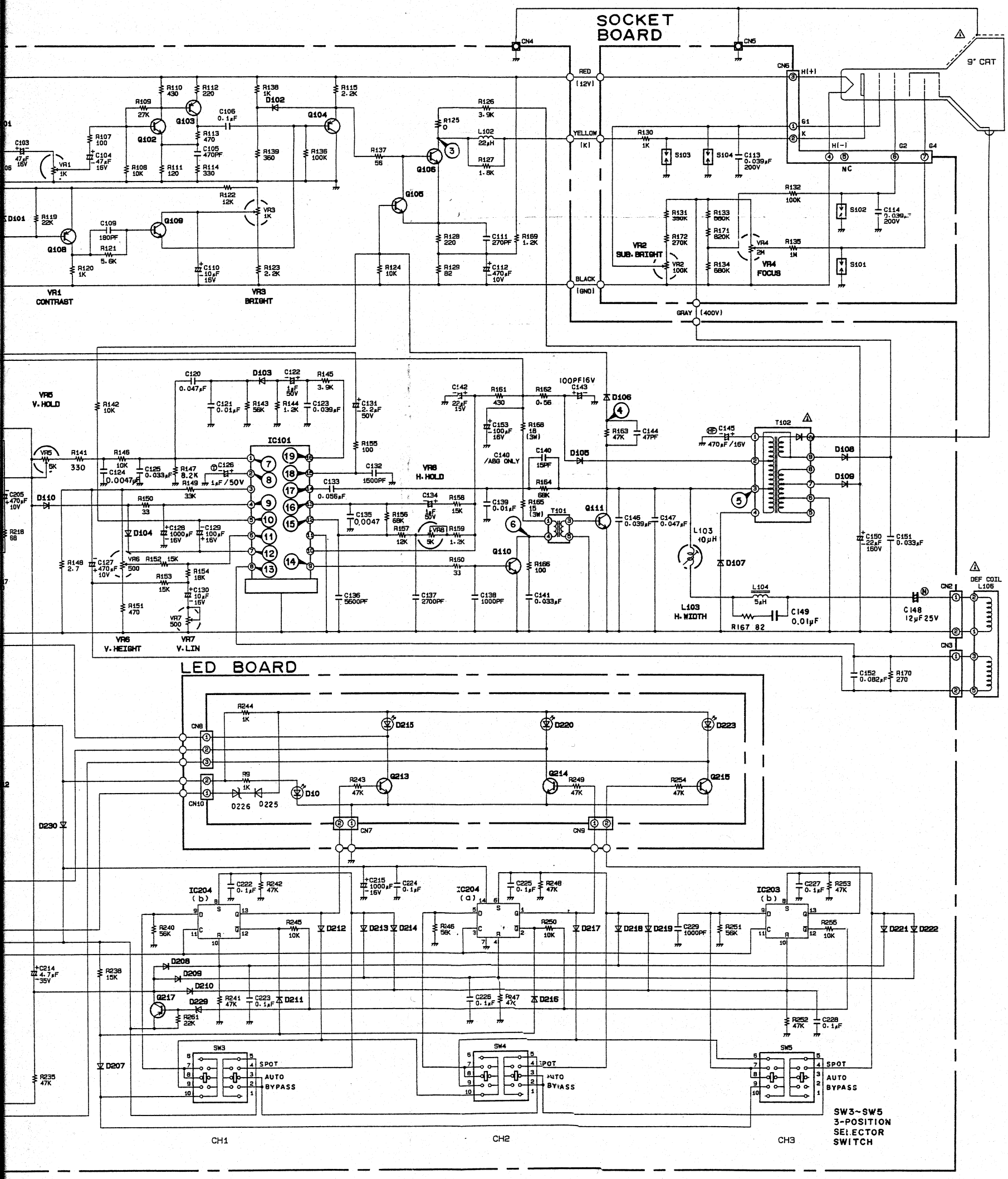


20. 20V/DIV,10μsec/DIV



PRODUCT SAFETY NOTICE

COMPONENT IDENTIFIED WITH THE "⚠" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY.
WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED.



MAIN BOARD

IC1	D3
IC101	C5
IC201	B3
IC202	A3
IC203	A4,B7
IC204	B5,B6
IC301	A1,B1,C1
Q1	D2
Q101	D4
Q102	D4
Q103	D5
Q104	D5
Q105	D5
Q106	D5
Q107	D4
Q108	D4
Q109	D4
Q110	C6
Q111	C6
Q201	C3
Q202	C3
Q204	C3
Q205	C3
Q206	C4
Q207	C4
Q208	C4
Q209	B2
Q210	B3
Q211	B4
Q212	B4
Q217	A4
Q301	C1
Q302	C1
Q303	C2
Q304	C2
Q305	C2
Q306	C2
Q401	B1
Q402	B1
Q403	B2
Q404	B2
Q405	B2
Q406	B2
Q501	A1
Q502	A1
Q503	A2
Q504	A2
Q505	A2
Q506	A2
D1	D1
D2	D2
D3	D2
D4	D2
D5	D2
D6	D2
D7	D2
D8	D3
D9	D3
D101	D4
D102	D5
D103	C5
D104	C4
D105	C6
D106	C6
D107	C6
D108	C7
D109	C7
D110	C4
D201	C3
D203	C3
D204	B3
D207	A4
D208	A5
D209	A5
D210	A5
D211	A5
D212	B5
D213	B5
D214	B5
D216	A6
D217	B6
D218	B6
D219	B6
D221	B7
D222	B7
D224	A3
D229	A5
D230	B4
D301	C1
D401	B1
D501	A1
D502	A1

LED BOARD

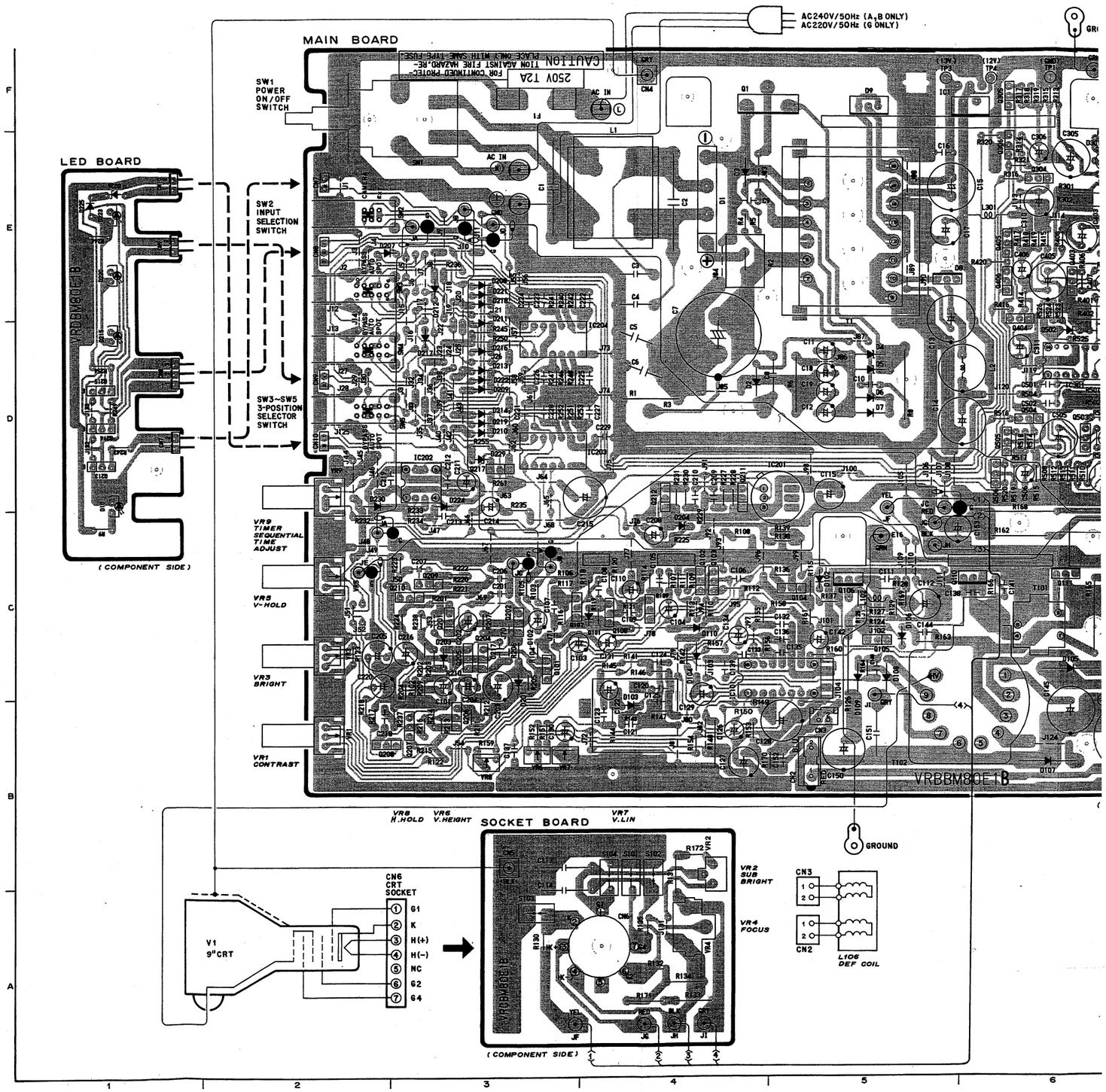
Q213	B5
Q214	B6
Q215	B6
D10	B5
D215	B5
D220	B6
D223	B6
D225	B5
D226	B5

	IÇ1	IC101	IC201	IC202	IC203	IC204	IC301
Pin 1	0	4.5	2.5	0	0	0	21.8
2	3.2	6.7	5.1	11.3	11.3	11.2	18.1
3	12.1	3.6	0	11.3	11.9	0	20.8
4	12.1	11.0	0	0	11.3	10.8	22.2
5	14.2	1.3	0	7.5	11.3	10.7	20.8
6		2.0	0	-	0	0	18.1
7		11.0	0	-	0	0	21.7
8		6.2	0	11.3	0	11.3	21.6
9		0.3	10.8		0	0.5	18.1
10		6.8	0		10.8	0	20.8
11		0	11.2		0	0	0
12		3.5	0		11.2	0	0
13		3.5	11.3		0	0	0
14		2.3			0	11.3	21.9
15		3.9					
16		0.2					

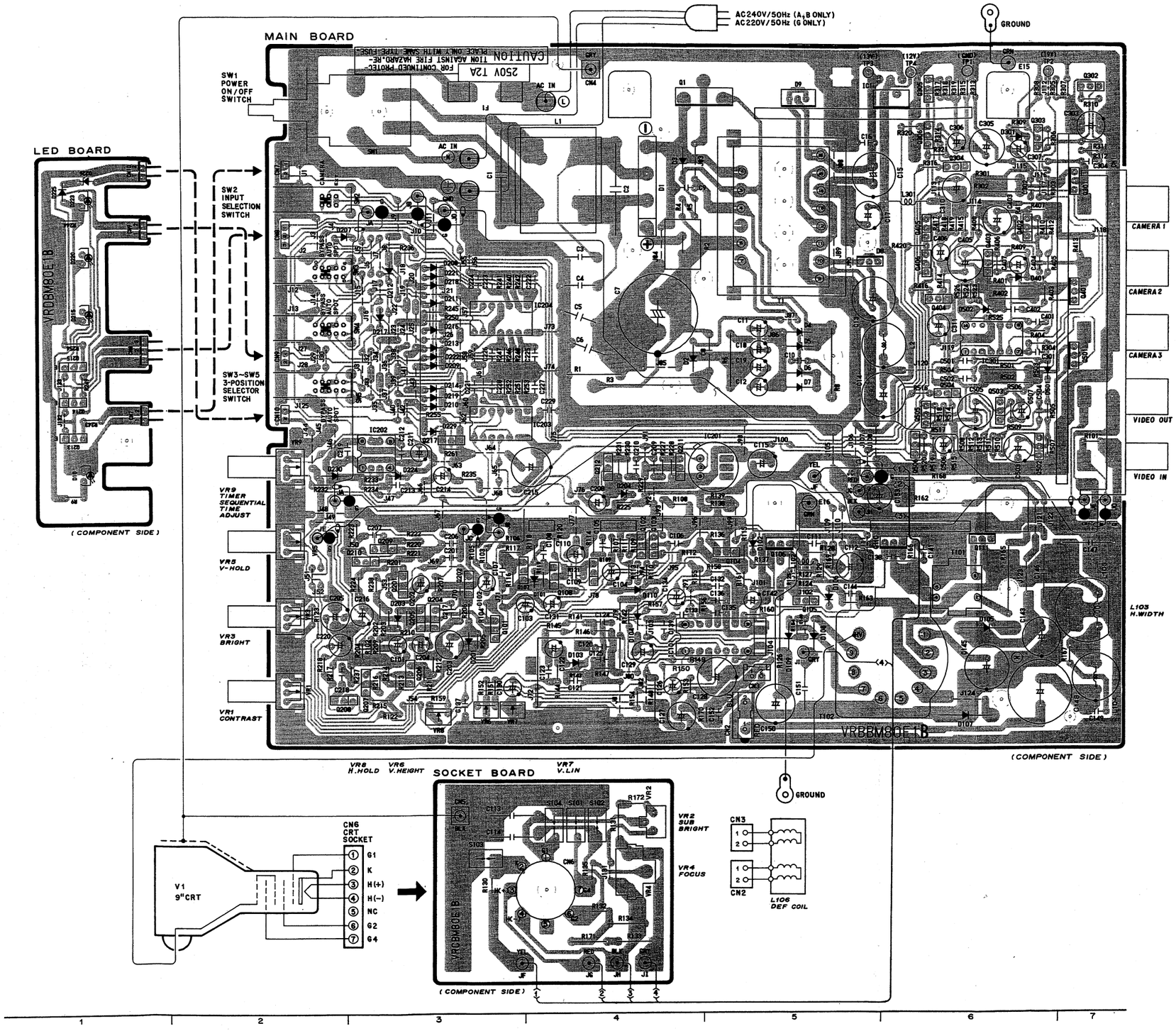
	B	C	E
Q1	-0.2	-	0
Q101	5.8	12.0	5.1
Q102	2.4	9.2	1.8
Q103	9.1	6.3	9.8
Q104	1.3	0	1.9
Q105	0.8	1.9	1.4
Q106	1.9	88.7	1.4
Q107	11.3	11.4	12.0
Q108	12.0	0	12.0
Q109	0	2.0	1.3
Q110	0	9.4	0
Q111	0	20.5	0
Q201	0.2	3.7	3.6
Q202	3.7	0	4.4
Q204	4.3	12.0	3.8
Q205	4.0	12.0	3.7
Q206	0	0	4.1
Q207	10.7	7.9	11.4
Q208	7.9	12.0	7.2
Q209	12.0	0.2	11.4
Q210	0.7	0	0
Q211	0	11.9	0
Q212	0	4.3	0
Q213	0	8.1	0
Q214	0.7	0.1	0
Q215	0	8.1	0
Q217	11.3	0	11.3
Q301	21.6	0	22.1
Q302	21.9	10.4	22.2
Q303	22.1	15.6	22.2
Q304	11.8	0	0
Q305	8.3	12.1	0

	B	C	E
Q306	7.6	0	8.2
Q401	21.6	0	22.1
Q402	21.8	10.4	22.1
Q403	22.1	15.5	22.1
Q404	11.8	0	12.0
Q405	0	12.0	8.1
Q406	8.1	0	8.2
Q501	21.6	1.0	22.1
Q502	21.8	10.3	22.1
Q503	22.1	15.6	22.1
Q504	11.8	0	0
Q505	8.3	12.0	8.1
Q506	8.1	0	8.2

CONDUCTOR VIEW



CONDUCTOR VIEW



MAIN BOARD

IC1	F6	D106	C5
IC101	C5	D107	B6
IC201	D5	D108	C5
IC202	D3	D109	C5
IC203	D3	D110	C4
IC204	D3	D201	C3
IC301	D6		
		D203	C3
Q1	F4	D204	C4
Q101	C3	D207	E3
Q102	C4	D208	E3
Q103	C4	D209	D3
Q104	C5	D210	D3
Q105	C5	D211	D3
Q106	C5	D212	E3
Q107	C3	D213	D3
Q108	C4	D214	D3
Q109	C4		
		D215	D3
Q110	C6	D216	D3
Q111	C6	D217	D3
Q201	C3	D218	E3
Q202	C3	D219	D3
Q204	C3	D221	E3
Q205	C3	D222	D3
Q206	B3	D224	D3
Q207	B3	D229	D3
Q208	B2	D230	D2
Q209	C3	D301	E6
Q210	C3	D401	E6
Q211	D4	D501	D6
Q212	D4	D502	D6
Q217	D3		
Q301	E7		
Q302	F7		
Q303	E6		
Q304	E6		
Q305	F6		
Q306	E6		
Q401	E7		
Q402	E6		
Q403	E6		
Q404	E6		
Q405	E6		
Q406	E6		
Q501	D7		
Q502	D6		
Q503	D6		
Q504	D6		
Q505	D6		
Q506	D6		
D1	E4		
D2	D4		
D3	E4		
D4	D5		
D5	D5		
D6	D5		
D7	D5		
D8	E5		
D9	F5		
D101	C4		
D102	C5		
D103	B4		
D104	C4		
D105	C6		

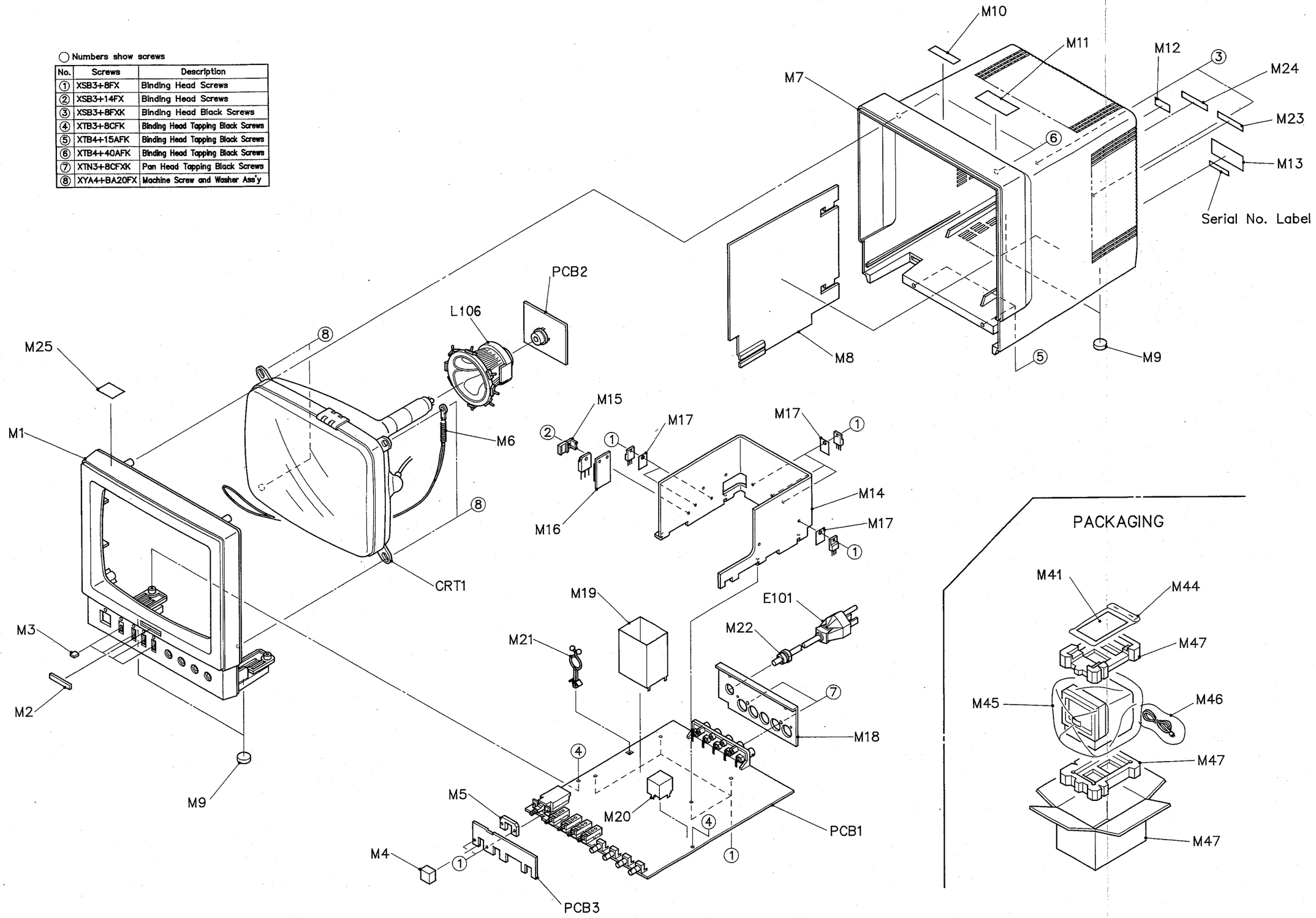
LED BOARD

Q213	D1
Q214	D1
Q215	D1
D10	D1
D215	D1
D220	E1
D223	E1
D225	E1
D226	E1

EXPLODED VIEW

◯ Numbers show screws

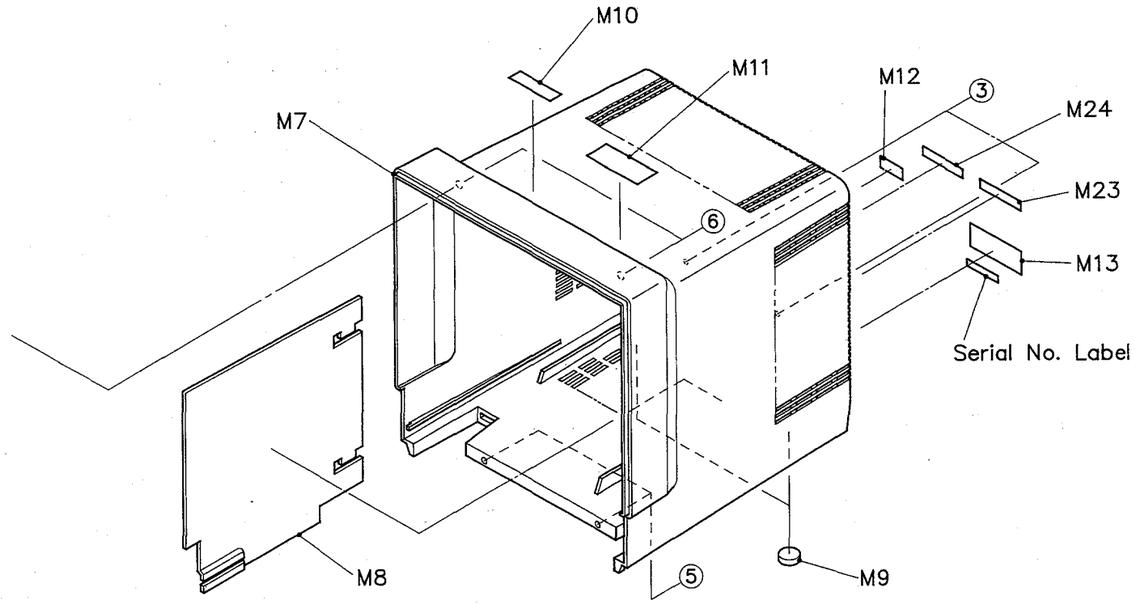
No.	Screws	Description
①	XSB3+8FX	Binding Head Screws
②	XSB3+14FX	Binding Head Screws
③	XSB3+8FXK	Binding Head Black Screws
④	XTB3+8CFK	Binding Head Tapping Black Screws
⑤	XTB4+15AFK	Binding Head Tapping Black Screws
⑥	XTB4+40AFK	Binding Head Tapping Black Screws
⑦	XTN3+8CFXK	Pan Head Tapping Black Screws
⑧	XYA4+BA20FX	Machine Screw and Washer Ass'y

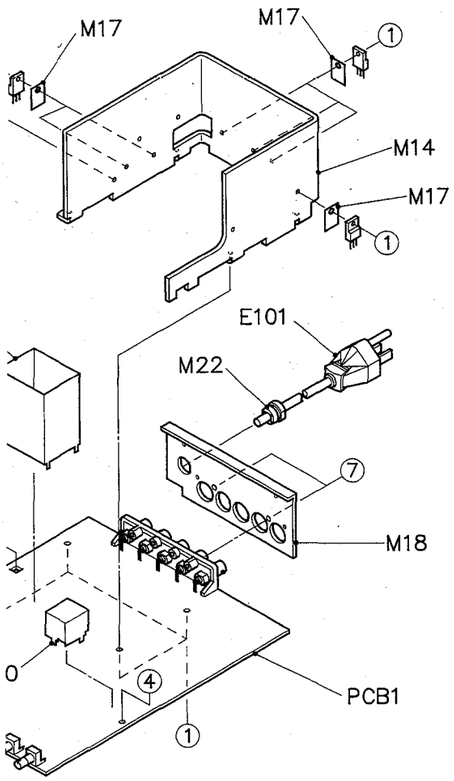


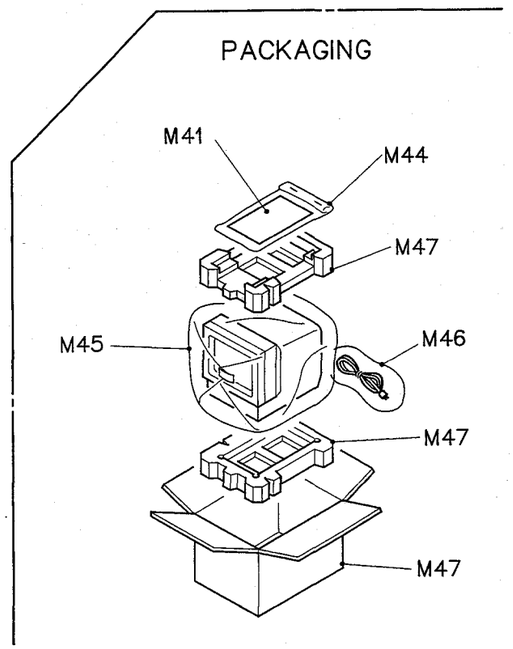
Important Noti
1. Components i
   When replacir
2. Printed circuit

REF.NO.		
CRT1	⚠	MI0
L106	⚠	YW
E101	⚠	YFK
		HBS
		YFV
M1		YW
M2		YW
M3		YW
M4		YW
M5		YW
M6		YW
M7		YW
M8		YW
M9		YFV
M10		YFV
M11		YW
M12		YW
M13	⚠	YW
		YW
		YW
M14		YW
M17		YFC
M18		YW
M21		YW
M22		YW
M23		YW
M24		YW
M25		YW

ODED VIEW







REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.		PART NO.	DESCRIPTION
MISCELLANEOUS			
CRT1	⚠	MI0908P4AUX	Cathode Ray Tube
L106	⚠	YWYS34468T	Deflection Coil
E101	⚠	YFKPGTSA25	AC Power Cord for WV-BM80/A
		HBS308A	AC Power Cord for WV-BM80/B
		YFVM030908A	AC Power Cord for WV-BM80/G
M1		YWV5BA0076A1	Front Escutcheon
M2		YWV2200DM03	Badge
M3		YWV5RA0307A4	Knob
M4		YWV5RA0306A4	Power Knob
M5		YWV2NA0338A4	Spacer
M6		YWV4JA0254A4	Earth Spring
M7		YWV5KA1061A1	Case
M8		YWV2HA0897A3	Shield Parts
M9		YFV5LA0003A4	Rubber Foot
M10		YFV7MA0099A4	Safety Label
M11		YWV411NUB01A	Caution Label
M12		YWV7SA1195A4	Label
M13	⚠	YWV7QA2340A4	Main Label for WV-BM80/A
		YWV7QA2341A4	Main Label for WV-BM80/B
		YWV7QA2322A4	Main Label for WV-BM80/G
M14		YWV7DA0268C2	Heat Sink
M17		YFCD20ACCAP	Insulator
M18		YWV5WA1133A3	Rear Panel
M21		YWY1426	Cord Clamp
M22		YWSR6W1	Cord Clamp
M23		YWV7MA0015A4	Safety Label for WV-BM80/G
M24		YWV7MA0081A4	Safety Label for WV-BM80/G
M25		YWS-XEGRB03A	Safety Label for WV-BM80/G

REF.NO.	PART NO.	DESCRIPTION
MAIN BOARD		
PCB1 (NLA)	YWVKBBM80E1A	Printed Circuit Board Assy
IC1	YWSI3120CA	IC
IC101	YWUPC1379C	IC
IC201	YWLQT50X1	IC
IC202	YWMC1455P	IC
IC203,204	YWMC14013BCP	IC
IC301	AN6554F	IC
Q1	2SC3461-LMCA	Transistor
Q101,102	2SD636-QRS	Transistor
Q103,104	2SB641-QRS	Transistor
Q105	2SD636-QRS	Transistor
Q106	2SC2258	Transistor
Q107,108	2SB641-QRS	Transistor
Q109	2SD636-QRS	Transistor
Q110	2SC1567-RS	Transistor
Q111	2SD1274B	Transistor
Q201	2SD636-QRS	Transistor
Q202	2SB641-QRS	Transistor
Q204-206	2SD636-QRS	Transistor
Q207	2SB641-QRS	Transistor
Q208	2SD636-QRS	Transistor
Q209	2SB641-QRS	Transistor
Q210-212	2SD636-QRS	Transistor
Q217	2SB641-QRS	Transistor
Q301	2SB941-PQ	Transistor
Q302	2SB642-QRS	Transistor
Q303,304	2SB641-QRS	Transistor
Q305	2SD636-QRS	Transistor
Q306	2SB641-QRS	Transistor
Q401	2SB941-PQ	Transistor
Q402	2SB642-QRS	Transistor
Q403,404	2SB641-QRS	Transistor
Q405	2SD636-QRS	Transistor
Q406	2SB641-QRS	Transistor
Q501	2SB941-PQ	Transistor
Q502	2SB642-QRS	Transistor
Q503,504	2SB641-QRS	Transistor
Q505	2SD636-QRS	Transistor
Q506	2SB641-QRS	Transistor
D1	YWD3SBA40	Diode
D2	ES01F	Diode
D3	EU02ZV0	Diode
D4	YWRD6.2FB1	Diode
D5	YWRD6.2FB2	Diode
D6,7	EU02ZV0	Diode
D8,9	YWFMU21S	Diode

REF.NO.	PART NO.	DESCRIPTION	
D101-103	MA165	Diode	
D104	EM01Z	Diode	
D105	YWRU4ZLFT2	Diode	
D106	MA165	Diode	
D107	YWRU4ZLFT2	Diode	
D108,109	ES01F	Diode	
D110	EM01Z	Diode	
D201,203	MA165	Diode	
D204	RD5.1JB2	Diode	
D207-214	MA165	Diode	
D216-219	MA165	Diode	
D221,222	MA165	Diode	
D224	MA165	Diode	
D229	RD5.1JB2	Diode	
D230	EM01Z	Diode	
D301,401	MA165	Diode	
D501	MA165	Diode	
D502	RD5.1JB2	Diode	
R1	ERC12ZGM156	Solid Resistor	15M ohms 1/2W
R2	ERF5TK1R0	Carbon	1 ohms 1/2W
R3	ERG5SJ273	Metal	27K ohms 5W
R4,5	ERDS2TJ104	Carbon	100K ohms 1/4W
R6	ERG2SJ101	Metal	100 ohms 2W
R8	ERG3SJ390	Metal	39 ohms 3W
R101	ERDS2TJ750	Carbon	75 ohms 1/4W
R102	ERDS2TJ103	Carbon	10K ohms 1/4W
R103	ERDS2TJ101	Carbon	100 ohms 1/4W
R104,105	ERDS2TJ223	Carbon	22K ohms 1/4W
R106	ERDS2TJ102	Carbon	1K ohms 1/4W
R107	ERDS2TJ101	Carbon	100 ohms 1/4W
R108	ERDS2TJ103	Carbon	10K ohms 1/4W
R109	ERDS2TJ273	Carbon	27K ohms 1/4W
R110	ERDS2TJ431	Carbon	430 ohms 1/4W
R111	ERDS2TJ121	Carbon	120 ohms 1/4W
R112	ERDS2TJ221	Carbon	220 ohms 1/4W
R113	ERDS2TJ471	Carbon	470 ohms 1/4W
R114	ERDS2TJ331	Carbon	330 ohms 1/4W
R115	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R116	ERDS2TJ103	Carbon	10K ohms 1/4W
R117	ERDS2TJ104	Carbon	100K ohms 1/4W
R118	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R119	ERDS2TJ223	Carbon	22K ohms 1/4W
R120	ERDS2TJ102	Carbon	1K ohms 1/4W
R121	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R122	ERDS2TJ123	Carbon	12K ohms 1/4W
R123	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R124	ERDS2TJ103	Carbon	10K ohms 1/4W
R126	ERG2SJ392	Metal	3.9K ohms
R127	ERDS2TJ182	Carbon	1.8K ohms 1/4W
R128	ERDS2TJ221	Carbon	220 ohms 1/4W
R129	ERDS2TJ820	Carbon	82 ohms 1/4W
R136	ERDS2TJ104	Carbon	100K ohms 1/4W
R137	ERDS2TJ560	Carbon	56 ohms 1/4W
R138	ERDS2TJ102	Carbon	1K ohms 1/4W
R139	ERDS2TJ361	Carbon	360 ohms 1/4W

REF.NO.	PART NO.	DESCRIPTION	
R141	ERDS2TJ331	Carbon	330 ohms 1/4W
R142	ERDS2TJ103	Carbon	10K ohms 1/4W
R143	ERDS2TJ563	Carbon	56K ohms 1/4W
R144	ERDS2TJ122	Carbon	1.2K ohms 1/4W
R145	ERDS2TJ392	Carbon	3.9K ohms 1/4W
R146	ERDS2TJ103	Carbon	10K ohms 1/4W
R147	ERDS2TJ822	Carbon	8.2K ohms 1/4W
R148	ERX1SJ2R7P	Metal	2.7 ohms 1W
R149	ERDS2TJ333	Carbon	33K ohms 1/4W
R150	ERD2FCG330P	Fuse Resistor	33 ohms
R151	ERDS2TJ471	Carbon	470 ohms 1/4W
R152,153	ERDS2TJ153	Carbon	15K ohms 1/4W
R154	ERDS2TJ183	Carbon	18K ohms 1/4W
R155	ERDS2TJ101	Carbon	100 ohms 1/4W
R156	ERDS2TJ683	Carbon	68K ohms 1/4W
R157	ERDS2TJ123	Carbon	12K ohms 1/4W
R158	ERDS2TJ153	Carbon	15K ohms 1/4W
R159	ERDS2TJ122	Carbon	1.2K ohms 1/4W
R160	ERDS2TJ330	Carbon	33 ohms 1/4W
R161	ERDS2TJ431	Carbon	430 ohms 1/4W
R162	ERX2SJR56	Metal	0.56 ohms 2W
R163	ERDS2TJ473	Carbon	47K ohms 1/4W
R164	ERDS2TJ683	Carbon	68K ohms 1/4W
R165	ERG3SJ150	Metal	15 ohms 3W
R166	ERDS2TJ101	Carbon	100 ohms 1/4W
R167	ERDS2TJ820	Carbon	82 ohms 1/4W
R168	ERG3SJ180	Metal	18 ohms 3W
R169	ERDS2TJ122	Carbon	1.2K ohms 1/4W
R170	ERDS2TJ271	Carbon	270 ohms 1/4W
R201	ERDS2TJ103	Carbon	10K ohms 1/4W
R202	ERDS2TJ752	Carbon	7.5K ohms 1/4W
R203	ERDS2TJ151	Carbon	150 ohms 1/4W
R204	ERDS2TJ272	Carbon	2.7K ohms 1/4W
R205	ERDS2TJ472	Carbon	4.7K ohms 1/4W
R206	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R207,209	ERDS2TJ152	Carbon	1.5K ohms 1/4W
R210	ERDS2TJ473	Carbon	47K ohms 1/4W
R211	ERDS2TJ153	Carbon	15K ohms 1/4W
R212	ERDS2TJ103	Carbon	10K ohms 1/4W
R213	ERDS2TJ102	Carbon	1K ohms 1/4W
R214	ERDS2TJ561	Carbon	560 ohms 1/4W
R215	ERDS2TJ101	Carbon	100 ohms 1/4W
R216	ERDS2TJ621	Carbon	620 ohms 1/4W
R217	ERDS2TJ331	Carbon	330 ohms 1/4W
R218	ERDS2TJ680	Carbon	68 ohms 1/4W
R220	ERDS2TJ563	Carbon	56K ohms 1/4W
R221	ERDS2TJ224	Carbon	220K ohms 1/4W
R222	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R223	ERDS2TJ223	Carbon	22K ohms 1/4W
R224	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R225	ERDS2TJ332	Carbon	3.3K ohms 1/4W
R227	ERDS2TJ102	Carbon	1K ohms 1/4W
R228	ERDS2TJ332	Carbon	3.3K ohms 1/4W
R229	ERDS2TJ103	Carbon	10K ohms 1/4W
R230	ERDS2TJ102	Carbon	1K ohms 1/4W

REF.NO.	PART NO.	DESCRIPTION	
R231	ERDS2TJ332	Carbon	3.3K ohms 1/4W
R232	ERDS2TJ203	Carbon	20K ohms 1/4W
R233	ERDS2TJ472	Carbon	4.7K ohms 1/4W
R234,235	ERDS2TJ473	Carbon	47K ohms 1/4W
R236	ERDS2TJ153	Carbon	15K ohms 1/4W
R237	ERDS2TJ391	Carbon	390 ohms 1/4W
R238	ERDS2TJ683	Carbon	68K ohms 1/4W
R240	ERDS2TJ563	Carbon	56K ohms 1/4W
R241,242	ERDS2TJ473	Carbon	47K ohms 1/4W
R245	ERDS2TJ103	Carbon	10K ohms 1/4W
R246	ERDS2TJ563	Carbon	56K ohms 1/4W
R247,248	ERDS2TJ473	Carbon	47K ohms 1/4W
R250	ERDS2TJ103	Carbon	10K ohms 1/4W
R251	ERDS2TJ563	Carbon	56K ohms 1/4W
R252,253	ERDS2TJ473	Carbon	47K ohms 1/4W
R255	ERDS2TJ103	Carbon	10K ohms 1/4W
R261	ERDS2TJ223	Carbon	22K ohms 1/4W
R301,302	ER050CKF10R0	Metal	10 ohms
R303	ERDS2TJ103	Carbon	10K ohms 1/4W
R304	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R305	ERDS2TJ333	Carbon	33K ohms 1/4W
R306	ERDS2TJ223	Carbon	22K ohms 1/4W
R307	ERDS2TJ473	Carbon	47K ohms 1/4W
R308	ERDS2TJ823	Carbon	82K ohms 1/4W
R309	ERDS2TJ103	Carbon	10K ohms 1/4W
R310	ERDS2TJ101	Carbon	100 ohms 1/4W
R311	ERDS2TJ152	Carbon	1.5K ohms 1/4W
R312	ERDS2TJ104	Carbon	100K ohms 1/4W
R313	ERDS2TJ103	Carbon	10K ohms 1/4W
R314	ERDS2TJ151	Carbon	150 ohms 1/4W
R315	ERDS2TJ820	Carbon	82 ohms 1/4W
R316	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R317	ERDS2TJ101	Carbon	100 ohms 1/4W
R318	ERDS2TJ123	Carbon	12K ohms 1/4W
R319	ERDS2TJ273	Carbon	27K ohms 1/4W
R320,321	ERDS2TJ272	Carbon	2.7K ohms 1/4W
R401,402	ER050CKF10R0	Metal	10 ohms
R403	ERDS2TJ103	Carbon	10K ohms 1/4W
R404	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R405	ERDS2TJ333	Carbon	33K ohms 1/4W
R406	ERDS2TJ223	Carbon	22K ohms 1/4W
R407	ERDS2TJ473	Carbon	47K ohms 1/4W
R408	ERDS2TJ823	Carbon	82K ohms 1/4W
R409	ERDS2TJ103	Carbon	10K ohms 1/4W
R410	ERDS2TJ101	Carbon	100 ohms 1/4W
R411	ERDS2TJ152	Carbon	1.5K ohms 1/4W
R412	ERDS2TJ104	Carbon	100K ohms 1/4W
R413	ERDS2TJ103	Carbon	10K ohms 1/4W
R414	ERDS2TJ151	Carbon	150 ohms 1/4W
R415	ERDS2TJ820	Carbon	82 ohms 1/4W
R416	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R417	ERDS2TJ101	Carbon	100 ohms 1/4W
R418	ERDS2TJ123	Carbon	12K ohms 1/4W
R419	ERDS2TJ273	Carbon	27K ohms 1/4W
R420	ERDS2TJ272	Carbon	2.7K ohms 1/4W

REF.NO.	PART NO.	DESCRIPTION	
R501,502	ER050CKF10R0	Metal	10 ohms
R503	ERDS2TJ103	Carbon	10K ohms 1/4W
R504	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R505	ERDS2TJ333	Carbon	33K ohms 1/4W
R506	ERDS2TJ223	Carbon	22K ohms 1/4W
R507	ERDS2TJ473	Carbon	47K ohms 1/4W
R508	ERDS2TJ823	Carbon	82K ohms 1/4W
R509	ERDS2TJ103	Carbon	10K ohms 1/4W
R510	ERDS2TJ101	Carbon	100 ohms 1/4W
R511	ERDS2TJ152	Carbon	1.5K ohms 1/4W
R512	ERDS2TJ104	Carbon	100K ohms 1/4W
R513	ERDS2TJ103	Carbon	10K ohms 1/4W
R514	ERDS2TJ151	Carbon	150 ohms 1/4W
R515	ERDS2TJ820	Carbon	82 ohms 1/4W
R516	ERDS2TJ562	Carbon	5.6K ohms 1/4W
R517	ERDS2TJ101	Carbon	100 ohms 1/4W
R518	ERDS2TJ123	Carbon	12K ohms 1/4W
R519	ERDS2TJ273	Carbon	27K ohms 1/4W
R520	ERDS2TJ272	Carbon	2.7K ohms 1/4W
R523	ER0S2CKF1201	Metal	1.2K ohms
R524	ER0S2CKF1801	Metal	1.8K ohms
R525	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R526	ER0S2CKF1601	Metal	1.6K ohms 1/4W
VR1,3	EVUE20E20B13	Variable Resistor	1K ohms
VR5	EVUE20E20B53	Variable Resistor	5K ohms
VR6,7	EVND2AA03B52	Variable Resistor	500 ohms
VR8	EVND2AA03B53	Variable Resistor	5K ohms
VR9	EVUE20E20A16	Variable Resistor	1M ohms
C1,2 ⚠	ECQU2A224KN	Plastic	0.22 µF
C3,4	ECKDWS152ME	Ceramic	1500 pF
C5,6	ECKDWS471KB	Ceramic	470 pF
C7	EC0S2GG121H	Electrolytic	120 µF 400V
C8	ECQE2104KS	Plastic	0.1 µF 200V
C9	ECKD3A221KBN	Ceramic	220 pF
C10	ECQV1H393JZ	Plastic	0.039 µF 50V
C11,12	ECEA1CGE470	Electrolytic	47 µF 16V
C13,14	ECA1VFZ331	Electrolytic	330 µF 35V
C15	ECEA1EF331	Electrolytic	330 µF 25V
C16	ECQV1H334JZ	Plastic	0.33 µF 50V TF
C17	ECEA1CU221	Electrolytic	220 µF 16V
C18	ECEA1CGE470	Electrolytic	47 µF 16V
C19	ECEA1CGE470	Electrolytic	47 µF 16V
C101-104	ECEA1CU470	Electrolytic	47 µF 16V
C105	ECQP1H471JZ	Plastic	470 pF 50V
C106	ECQV1H104JZ	Plastic	0.1 µF 50V (TF)
C107	ECQV1H104JZ	Plastic	0.1 µF 50V (TF)
C108	ECCF1H470JC	Ceramic	47 pF 50V
C109	ECCF1H181J	Ceramic	180 pF 50V
C110	ECEA1CU100	Electrolytic	10 µF 16V
C111	ECQP1H271JZ	Plastic	270P 50V
C112	ECEA1AU471	Electrolytic	470 µF 10V
C115	ECEA1CSS221	Electrolytic	220 µF 16V
C120	ECQV1H473JZ	Plastic	0.047µF 50V (TF)
C121	ECQB1H103JZ	Plastic	0.01 µF 50V
C122	ECEA1HU010	Electrolytic	1 µF 50V

REF.NO.	PART NO.	DESCRIPTION
C123	ECQV1H393JZ	Plastic 0.039 µF 50V
C124	ECQB1H472JZ	Plastic 4700 pF 50V
C125	ECQM1H333JZ	Plastic 0.033 µF 50V
C126	ECQV1H105JZ	Plastic 1 µF 50V
C127	ECEA1AU471	Electrolytic 470 µF 10V
C128	ECEA1CU102	Electrolytic 1000 µF 16V
C129	ECEA1CU101	Electrolytic 100 µF.16V
C130	ECEA1CU100	Electrolytic 10 µF 16V
C131	ECEA1HU2R2	Electrolytic 2.2 µF 50V
C132	ECQB1H152JZ	Plastic 1500 pF 50V
C133	ECQM1H563JZ	Plastic 0.056 µF 50V
C134	ECEA1HU010	Electrolytic 1 µF 50V
C135	ECQB1H472JZ	Plastic 4700 pF 50V
C136	ECQB1H562JZ	Plastic 5600 pF 50V
C137	ECQB1H272JZ	Plastic 2700 pF 50V
C138	ECKW1H102KB	Ceramic 1000 pF
C139	ECQB1H103JZ	Plastic 0.01 µF 50V
C140	ECCD2H150J	Ceramic 15 pF
C141	ECQM1H333KZ	Plastic 0.033 µF 50V
C142	ECEA1CU220	Electrolytic 22 µF 16V
C143	ECEA1CGE102	Electrolytic 1000 µF 16V
C144	ECCR2H470J	Ceramic 47 pF
C145	ECEA1CF471	Electrolytic 470 µF 16V
C146	ECQF4393JZ	Plastic 0.039 µF
C147	ECQF4473JZ	Plastic 0.047 µF
C148	ECEA1EW120Z	Electrolytic 12 µF 25V
C149	ECQB1H103JZ	Plastic 0.01 µF 50V
C150	ECEA2CU220	Electrolytic 22 µF 160V
C151	ECQE6333KZ	Plastic 0.033 µF
C152	ECQV1H823JZ	Plastic 0.082 µF
C153	ECEA1CU101	Electrolytic 100 µF 16V
C201	ECQV1H104JZ	Plastic 0.1 µF 50V (TF)
C202	ECEA1CU470	Electrolytic 47 µF 16V
C203	ECEA1CU221	Electrolytic 220 µF 16V
C204	ECEA1CU470	Electrolytic 47 µF 16V
C205	ECEA1AU471	Electrolytic 470 µF 10V
C206	ECQB1H103JZ	Plastic 0.01 µF 50V
C207	ECCF1H221J	Ceramic 220 pF 50V
C208	ECEA1AU330	Electrolytic 33 µF 10V
C209	ECQP1H471JZ	Plastic 470 pF 50V
C210	ECQM1H563JZ	Plastic 0.056 µF 50V
C211	ECEA10V33	Electrolytic 33 µF 10V
C212,213	ECQB1H103JZ	Plastic 0.01 µF 50V
C214	ECEA1VU4R7	Electrolytic 4.7 µF 35V
C215	ECEA1CU102	Electrolytic 1000 µF 16V
C216	ECEA1CU101	Electrolytic 100 µF 16V
C217	ECQB1H103JZ	Plastic 0.01 µF 50V
C218	ECCF1H101J	Ceramic 100 pF 50V
C219	ECQV1H104JZ	Plastic 0.1 µF 50V (TF)
C220	ECEA1CU101	Electrolytic 100 µF 16V

REF.NO.	PART NO.	DESCRIPTION
C221	ECQV1H104JZ	Plastic 0.1 µF 50V (TF)
C222-224	ECQV1H104JZ	Plastic 0.1 µF 50V (TF)
C225-228	ECQV1H104JZ	Plastic 0.1 µF 50V (TF)
C229	ECKW1H102KB	Ceramic 1000 pF 50V
C301,302	ECQB1H103JZ	Plastic 0.01 µF 50V
C303	ECEA1VU101	Electrolytic 100 µF 35V
C304	ECQV1H473JZ	Plastic 0.047 µF 50V (TF)
C305	ECEA1EU471	Electrolytic 470 µF 25V
C306	ECEA1CU470	Electrolytic 47 µF 16V
C307	ECEA1AU101	Electrolytic 100 µF 10V
C310	ECEA1CU221	Electrolytic 220 µF 16V
C311	ECEA1VU330	Electrolytic 33 µF 35V
C401	ECQB1H103JZ	Plastic 0.01 µF 50V
C402	ECQB1H103JZ	Plastic 0.01 µF 50V
C403	ECEA1VU101	Electrolytic 100 µF 35V
C404	ECQV1H473JZ	Plastic 0.047µF 50V (TF)
C405	ECEA1EU471	Electrolytic 470 µF 25V
C406	ECEA1CU470	Electrolytic 47µ µF 16V
C407	ECEA1AU101	Electrolytic 100 µF 10V
C501	ECQB1H103JZ	Plastic 0.01 µF 50V
C502	ECQB1H103JZ	Plastic 0.01µ F 50V
C503	ECEA1VU101	Electrolytic 100 µF 35V
C504	ECQV1H473JZ	Plastic 0.047 µF 50V
C505	ECEA1EU471	Electrolytic 470 µF 25V
C506	ECEA1CU470	Electrolytic 47 µF 16V
C507	ECEA1AU101	Electrolytic 100 µF 10V
⚠ L1	YFELF18D650P	Coil 65 µH
L2	ELC12E009	Coil 56 µH
L102	YWLAP2TA220K	Coil 22 µH
L103	ELH16F763A	Coil 10 µH
L104	ELH5L415	Coil 5 µH
L301	YWLAL4NA101K	Coil 100 µH
⚠ T1	YWETS35K444V	Power Transformer
T101	TLH3412K	Low Freq Transformer
⚠ T102	ETF30L10AY	Flyback Transformer
SW1	YWSDDFA3	Push Switch
SW2	YWSLLY0322	Lever Switch
SW3-5	YWSLLY0323	Lever Switch
CN1	YWP2158	5-pin BNC Connector
CN2	YWTV50P02V1	2-pin Connector
CN3	YWTSLP02PV2	2-pin Connector
CN4	YW003P2100	3-pin Connector
⚠ F1	XBA2C20ET0A	Current Fuse 2A 250V
E5	YWM1748A	Transistor Holder
E17	YWVEJA0004A4	Insulator
E18,19	YWSN5053	Fuse Holder
E20-22	YWTM028	Terminal
E23-26	YW32BM7R5	Terminal
E29,30	YW851440	Insulator
M19	YWV2HA0893A4	Shield Parts
M20	YWV2HA0894B4	Shield Parts

REF.NO.	PART NO.	DESCRIPTION
SOCKET BOARD		
PCB2 (NLA)	YWVKCBM80E1A	Printed Circuit Board Assy
R130	ERDS2TJ102	Carbon 1K ohms 1/4W
R131	ERD25FJ394	Carbon 390K ohms 1/4W
R132	ERDS2TJ104	Carbon 100K ohms 1/4W
R133,134	ERD25FJ684	Carbon 680K ohms 1/2W
R135	ERDS2TJ105	Carbon 1M ohms 1/4W
R171	ERD25FJ824	Carbon 820K ohms 1/4W
R172	ERDS2TJ274	Carbon 270K ohms 1/4W
VR2	EVN59AA00B15	Variable Resistor 100 K ohms
VR4	EVMJ6U10KB26	Variable Resistor 2M ohms
C113,114	ECQM2393KZ	Plastic 0.039 µF 200V
CB101-104	YFAG20PC122F	Braker
CN5	YW003P2100	3-pin Connector
CN6	YWP2950251	CRT Socket
LED BOARD		
PCB3 (NLA)	YWVKDBM80E1A	Printed Circuit Board Assy
Q213-215	2SD636-QRS	Transistor
D10	LN28RP	LED
D215,220	LN39GP	LED
D223	LN39GP	LED
D225	MA165	Diode
D226	MA4033-M	Diode
R9	ERDS2TJ102	Carbon 1K ohms 1/4W
R243	ERDS2TJ473	Carbon 47K ohms 1/4W
R244	ERDS2TJ102	Carbon 1K ohms 1/4W
R249,254	ERDS2TJ473	Carbon 47K ohms 1/4W
CN7	YWTIXP02PB1	2-pin Connector
CN8	YWTIXP03PB1	3-pin Connector
CN9,10	YWTIXP02PB1	2-pin Connector

REF.NO.	PART NO.	DESCRIPTION
ACCESSORY PARTS/PACKAGING PARTS		
M41	YWV8QA2212AN	Operating Instructions
M44	XZB26X40C05	Polyethylene Bag
M45	XZB50X63C05	Polyethylene Bag
M46	YWT20X35C03	Polyethylene Bag
M47	YWV9CA1497AN	Packaging Assy